Methods

Calling Methods

```
turnRight();

move();          readInt("Int please! ");


println("hello world");

                    rect.getX();

drawRobotFace();


          rect.setLocation(10, 20);
```
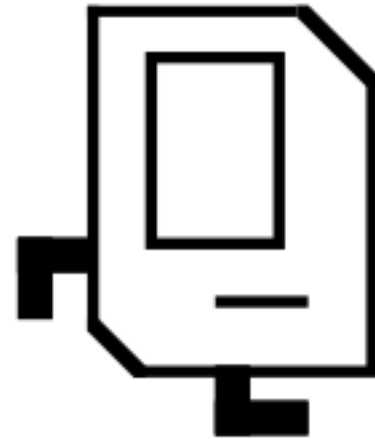
Defining a Method

```
private void turnRight() {
    turnLeft();
    turnLeft();
    turnLeft();
}
```

Anatomy of a method

```java
public void run() {
    double mid = average(5.0, 10.2);
    println(mid);
}



private double average(double a, double b) {
    double sum = a + b;
    return sum / 2;
}
```

Anatomy of a method

```
public void run() {
    double mid = average(5.0, 10.2);
    println(mid);
}
```

Output expected   Input expected

```
private double average(double a, double b) {
    double sum = a + b;
    return sum / 2;
}
```

Anatomy of a method

```
public void run() {
    double mid = average(5.0, 10.2);
    println(mid);
}
```

name

```
private double average(double a, double b) {
    double sum = a + b;
    return sum / 2;
}
```

Anatomy of a method

```java
public void run() {
    double mid = average(5.0, 10.2);
    println(mid);
}


private double average(double a, double b) {
    double sum = a + b;
    return sum / 2;
}
```

body

Anatomy of a method

```java
public void run() {
    double mid = average(5.0, 10.2);
    println(mid);
}



private double average(double a, double b) {
    double sum = a + b;
    return sum / 2;
}
```

return

Anatomy of a method

method "call"

```
public void run() {
    double mid = average(5.0, 10.2);
    println(mid);
}



private double average(double a, double b) {
    double sum = a + b;
    return sum / 2;
}
```

Void Example

```
private void printIntro() {
    println("Welcome to class");
    println("It's the best part of my day.");
}


public void run() {
    printIntro();
}
```

Example

```
private double metersToCm(double meters) {
    return 100 * meters;
}


public void run() {
    println(metersToCm(5.2));
}
```

Parameter Example

```java
private void printOpinion(int num) {
    if(num == 5) {
        println("I love 5!");
    } else {
        println("Whattever");
    }
}

public void run() {
    printOpinion(5);
}
```

Multiple Return

```java
private String getMonthName(int i) {
   if (i == 0) {
      return "January";
   }
   if (i == 1) {
      return "February";
   }
   ...
   return "Unknown";
}
```

Defining a Method

visibility *type* **nameOfMethod** (*parameters*) **{**
    statements
}

- *visibility:* usually `private` or `public`
- *type:* type returned by method (e.g., `int`, `double`, *etc.*)
  - Can be `void` to indicate that nothing is returned
- *parameters:* information passed into method

```java
private void run() {
    double r = readPositive("Enter radius: ");
    double area = getArea(r);
    println(area);
}

private double readPositive(String prompt) {
    double value = readDouble(prompt);
    while(value < 0) {
        println("Invalid");
        value = readDouble(prompt);
    }
    return value;
}



private double getArea(double radius) {
    return PI * radius * radius;
}
```

```java
public void run() {
    double r = readPositive("Enter radius: ");
    double area = getArea(r);
    println(area);
}
```

```java
public void run() {
    double r = readPositive("Enter radius: ");
    double area = getArea(r);
    println(area);
}
```

```java
public void run() {
    double r = readPositive("Enter radius: ");
    double area = getArea(r);
    println(area);
}
```

```java
public void run() {
    private double readPositive(String prompt) {
        double value = readDouble(prompt);
        while (value < 0) {
            println("Invalid");
            value = readDouble(prompt);
        }
        return value;
    }
```

```java
public void run() {
    private double readPositive(String prompt) {
        double value = readDouble(prompt);
        while (value < 0) {
            println("Invalid");
            value = readDouble(prompt);
        }
        return value;
    }
}
```

prompt   "Enter radius: "

```
public void run() {
private double readPositive(String prompt) {
    double value = readDouble(prompt);
    while (value < 0) {
        println("Invalid");
        value = readDouble(prompt);
    }
    return value;
}
}
```

prompt "Enter radius: "   value -3

```java
public void run() {
private double readPositive(String prompt) {
    double value = readDouble(prompt);
    while (value < 0) {
        println("Invalid");
        value = readDouble(prompt);
    }
    return value;
}
```

prompt "Enter radius: "   value -3

```
public void run() {
private double readPositive(String prompt) {
    double value = readDouble(prompt);
    while (value < 0) {
        println("Invalid");
        value = readDouble(prompt);
    }
    return value;
}
```

prompt "Enter radius: "   value -3

```
public void run() {
    private double readPositive(String prompt) {
        double value = readDouble(prompt);
        while (value < 0) {
            println("Invalid");
            value = readDouble(prompt);
        }
        return value;
    }
```

| prompt | "Enter radius: " | value | -3 |

```java
public void run() {
    private double readPositive(String prompt) {
        double value = readDouble(prompt);
        while (value < 0) {
            println("Invalid");
            value = readDouble(prompt);
        }
        return value;
    }
}
```

| prompt | "Enter radius: " | value | 42 |

```
public void run() {
    private double readPositive(String prompt) {
        double value = readDouble(prompt);
        while (value < 0) {
            println("Invalid");
            value = readDouble(prompt);
        }
        return value;
    }
}
```

| prompt | "Enter radius: " | value | 42 |

```java
public void run() {
    private double readPositive(String prompt) {
        double value = readDouble(prompt);
        while (value < 0) {
            println("Invalid");
            value = readDouble(prompt);
        }
        return value;
    }
}
```

| prompt | "Enter radius: " | value | 42 |

```java
public void run() {
    private double readPositive(String prompt) {
        double value = readDouble(prompt);
        while (value < 0) {
            println("Invalid");
            value = readDouble(prompt);
        }
        return value;
    }
}
```

| prompt | "Enter radius: " | value | 42 |

```java
public void run() {
    double r = readPositive("Enter radius: ");
    double area = getArea(r);
    println(area);
}
```

42

```java
public void run() {
    double r = readPositive("Enter radius: ");
    double area = getArea(r);
    println(area);
}
```

42

r   42

```java
public void run() {
    double r = readPositive("Enter radius: ");
    double area = getArea(r);
    println(area);
}
```

r 42

```java
public void run() {
    double r = readPositive("Enter radius: ");
    double area = getArea(r);
    println(area);
}
```

r `42`

```java
public void run() {
private double getArea(double radius) {
    return PI * radius * radius;
}
```

```
public void run() {
    private double getArea(double radius) {
        return PI * radius * radius;
    }



    radius  42
```

```
public void run() {

    private double getArea(double radius) {
        return PI * radius * radius;
    }



        radius  42
```

```java
public void run() {

private double getArea(double radius) {
    return PI * radius * radius;
}
                        5538.96


    radius  42
```

```java
public void run() {
    double r = readPositive("Enter radius: ");
    double area = getArea(r);   5538.96
    println(area);
}



  r   42
```

```
public void run() {
    double r = readPositive("Enter radius: ");
    double area = getArea(r);   5538.96
    println(area);
}
```

r `42`

```
public void run() {
    double r = readPositive("Enter radius: ");
    double area = getArea(r);    5538.96
    println(area);
}
```

r `42`   area `5538.96`

```java
public void run() {
    double r = readPositive("Enter radius: ");
    double area = getArea(r);
    println(area);
}
```

r `42`   area `5538.96`

```java
public void run() {
    double r = readPositive("Enter radius: ");
    double area = getArea(r);
    println(area);
}
```

r `42`   area `5538.96`

Bad Times With Methods

```java
// NOTE: This program is buggy!!

private void addFive(int x) {
  x += 5;
}


public void run() {
  int x = 3;
  addFive(x);
  println("x = " + x);
}
```

Good Times With Methods

```java
// NOTE: This program is feeling just fine...

private int addFive(int x) {
  x += 5;
   return x;
}


public void run() {
   int x = 3;
   x = addFive(x);
   println("x = " + x);
}
```

More Examples

Changed Name

```
private void run() {
    int num = 5;
    cow(num);
}

private void cow(int grass) {
    println(grass);
}
```
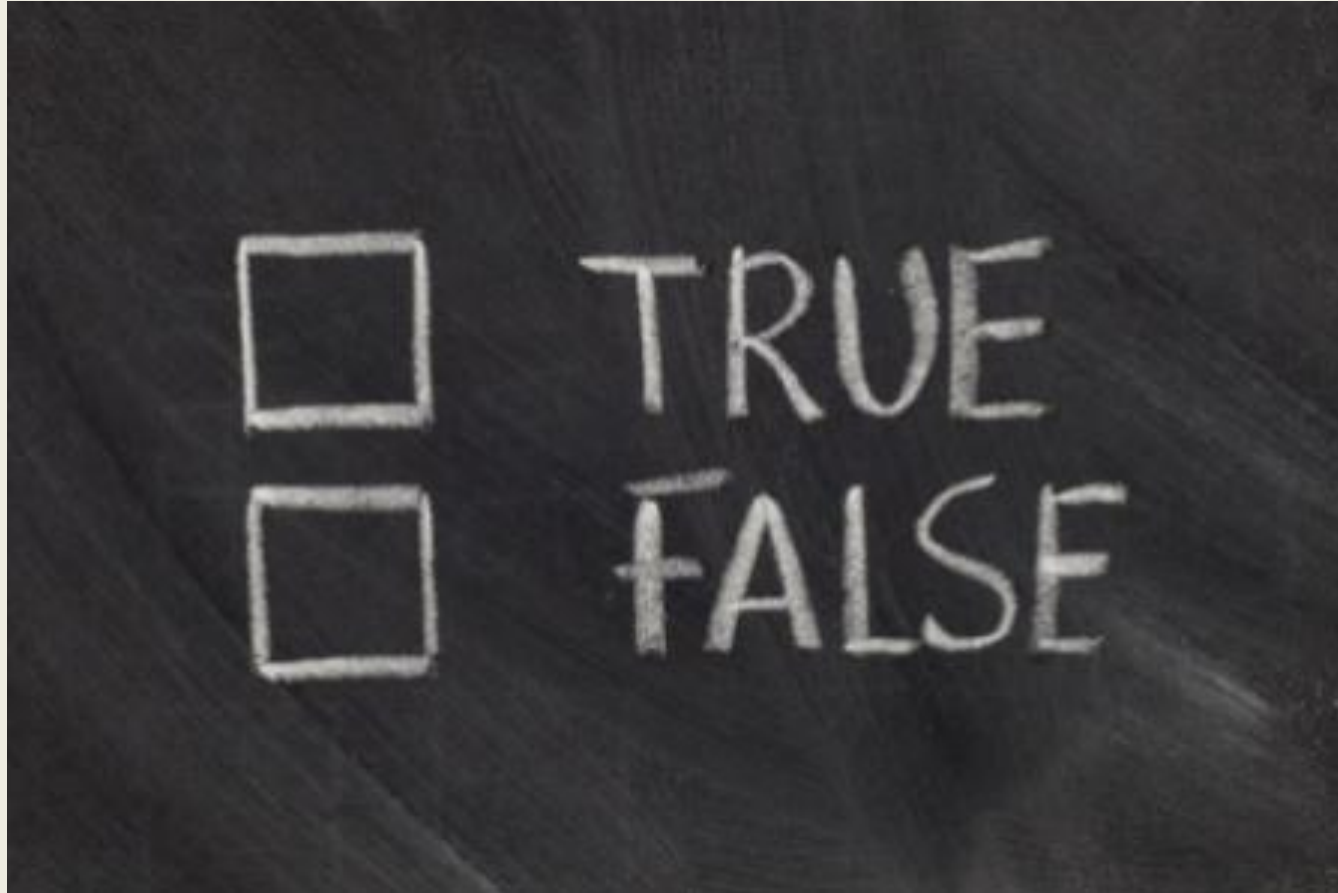
Same Variable

```java
private void run() {
    int num = 5;
    cow();
}

private void cow() {
    int num = 10;
    println(num);
}
```

Boolean

Boolean Variable

```
boolean karelIsAwesome = true;

boolean myBool = 1 < 2;
```

Boolean Operations

```java
boolean a = true;

boolean b = false;

//This is false
boolean a_and_b = a && b;

//This is true
boolean a_or_b = a || b;

//This is false
boolean not_a = !a;
```

Now that's style!